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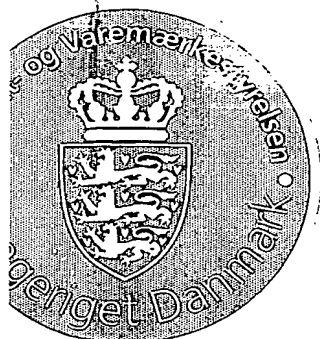
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Title: System for presenting and controlling information on a display device

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Patent- og Varemærkestyrelsen  
Økonomi- og Erhvervsministeriet

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Pia Høybye-Olsen



PATENT- OG VAREMÆRKESTYRELSEN

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**SYSTEM FOR PRESENTING AND CONTROLLING INFORMATION ON A  
DISPLAY DEVICE**

**Field of invention**

5 This invention relates to a display, particularly a display that is updated via a means of transferring data from a central server to the display using a wireless technology.

**Background of invention**

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Displaying systems comprising a rotary member having a plurality of light emitting diodes and a means of controlling these to create the appearance of an image are known technologies. Displays utilising this technology are, however,  
15 only available in one colour, as the light emitting diodes can only be switched on and off, creating one colour. This creates a serious limitation on the usability of the display device, as it is not possible to create multicoloured images.

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Furthermore, display devices communicating with a central server using a land based Internet connection, or a land based direct connection are known technologies. This is generally accomplished by setting up an Internet connection through a phone line, or a DSL line, assigning an IP address to the  
25 display device, or a peripheral unit able to communicate with the display device. A central server connected to the Internet is able to communicate with the display device using Internet protocol. It is also known technology to update or interact with a display device through the Internet, comprising the

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steps of communicating from a browser or a program to the central server, communicating from the server to the display device, and updating the display device. This technology comprises, however, a limitation, as the display needs to have a land based connection and cabling, making it hard to move the display device to another location, and complicating the setup process of a display device, as a land based connection is needed for each display device.

10 Summary of the invention

An object of the present invention is to solve the above identified problems in the known technologies. In particular, it is the object of the present invention to provide a system and a colour display unit enabling a user to interact with the display device by communicating with a central server through a wireless gateway using a wireless mobile device such as a mobile or cellular phone, a personal digital assistant, or a computer device.

A particular advantage of the present invention is provision of a system and display device for providing advertisement which may be changed in accordance with any particular offer e.g. a short term offer in a shop or restaurant.

A particular feature of the present invention relates to the provision of a touch sensitive area on the display device enabling a user to interact with the display device.

The above objects, advantage and feature together with numerous other objects, advantages and features, which will become evident from below detailed description, is obtained according to a first aspect of the present invention by a system

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according to independent claim 1, or is obtained according to a second aspect of the present invention by a display device according to independent claim 20.

- 5 Further, embodiments of the first and second aspect of the present invention are obtained according to dependent claims 2 to 19 and claim 21.

10 The display according to the first and second aspect of the present invention may comprise a rotary member mounted on a motor, where the rotary member may comprise a plurality of light emitting diodes and a processor capable of controlling these. When the rotary member rotates an image will be created in the area of the circumference of the rotary member when the  
15 light emitting diodes are controlled correctly. The rotary member may comprise light emitting diodes of more than one colour, making it possible to create a multicolour or full colour display. The display may be connected to a device capable of transferring data via a wireless protocol, this data  
20 being relayed to the display from a central server.

By introducing one or more sensors on the rotary member that are able to register an object, for instance a hand or a finger, in the near vicinity of the sensor a system can be  
25 created such that a touch-sensitive display may be created. The system comprises the rotary member with one or more sensors, the sensors being located so that each sensor is placed at a different length from the centre of rotation of the rotary member, preferably in such a way that the array of sensors is  
30 placed at regular intervals on the rotary member from the centre of rotation, to the edge, and a central processor able to receive input from the sensors. The central processor holds information enabling it to calculate the exact angle of a

revolution that the rotating member is at any specific point in time. This enables the processor to establish exactly on which global point on the display an object, for instance a hand or a finger, is, as the angle and the length form the centre of rotation to the sensor is known. The processor unit may handle this information in such a way that when an object is in the vicinity of a sensor the processor unit performs an action, based on which global point on the display the object is in the vicinity of, the processor may for instance update the display.

The touch-sensitive display introduced by fitting the rotary member with one or more sensors may for instance be created using magnetic sensors that are able to register a change in the magnetic field, they may be created using acoustic sensors that are able to register a change in sound volume or modulation, or they may be created using light sensors that are able to register a change in light intensity, or they may be created using another technology.

A number of displays may be controlled from a central server using this technology, making it possible to update a number of displays simultaneously. By adding a wireless gateway to the server, which gateway is capable of communicating with a mobile device such as a mobile phone through GSM, GPRS, UMTS, I-mode or other technology, it may be possible for a user with a mobile device to communicate with one or more signs through the wireless gateway to the server, and finally the sign or signs.

Connecting the server to the Internet may enable communication with one or more displays over the Internet. By using information sent from users via a mobile device and stored and sorted on the server, which information comprises information about which display or group of displays the user wishes to



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based internet connection. By introducing communication from an display to a central server using wireless technology the problem of having an advertising display that requires a land based connection for set-up is solved. Furthermore, it is possible to easily move the display to another location. The system is created by having a display, particularly an advertising display connected to a communication unit communicating with a central server through a wireless gateway. This communication unit can be a communication device capable of communicating via GSM, GPRS, UMTS, bluetooth, I-mode or 802.11b. The display device is connected to the communication unit, such that the display is able to communicate with the communication unit. A server that is connected to a corresponding communication unit makes it possible for a central server to communicate with the display device using the communication units respectively placed in connection with the display device, and the server. The communication unit makes it possible to update the display device from the central server by transferring data through the communication unit to the display. By multicasting from the server to two or more displays, it is possible to update an array of displays at once.

The invention may relate to updating an advertising display with new advertising messages using the communication unit. It is possible to update an advertising display with new advertising messages, and it is possible for the display to show these at pre-designated times.

The system according to the first aspect of the present invention may further be adapted for communication with a wireless mobile device such as a mobile or cellular phone, a personal digital assistant, a computer, or any combination

thereof. The communication may be established by having a mobile gateway connected to the central server, making it possible for a user to communicate from a mobile device to the server through said gateway. This enables a user to interact  
5 with one or more displays by interacting with the server through the gateway. If a user wishes to communicate to only one display, or a predefined group of displays the individual displays and/or group of displays may be assigned an ID tag that may be incorporated in the communication between the users  
10 mobile device and the central server. This communication may by example incorporate the user typing the ID tag for the desired display or group of displays in a communication session with the server. The central server may identify the display or displays in question by identifying it/them based on the ID  
15 tag, or information relating directly to an ID tag, such as the name of the place the display is placed. The server may utilise the information for updating the desired display.

Based on the users interaction the server may communicate with  
20 one or more displays. The mobile device may comprise a mobile phone or a personal digital assistant (PDA) that is connected to a mobile gateway. The mobile gateway may comprise WAP, GSM, GPRS, I-mode or UMTS. It is possible to create a system such that the gateway used for communicating from the mobile device  
25 to the server is a wireless gateway that comprises overtaxed text messages such as short messaging service (SMS) messages. This makes it possible to charge a user for communicating with the server through a mobile phone using SMS messages, and possibly updating one or more displays.

30 If the central server is connected to the Internet it is possible to control and update one or more displays from the Internet. This can be done through a program able to interact



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with the server, or it can be done through a browser. By adding a billing system it is possible to charge users for the service of updating one or more displays.

5 The central server according to the first aspect of the present invention may be adapted to store information submitted by users through the Internet, or through a wireless gateway. The submitted information may be categorised in relation to one or more displays, based on the users submission of an ID tag along  
10 with other information submitted by said users. Based on this it is possible to derive information such as demographical data, age, gender, or other information submitted by users for the viewers of one display or a group of displays.

15 **Brief description of the drawings**

The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed  
20 description of preferred embodiments of the present invention, with reference to the appended drawing, wherein:

figure 1, shows a first embodiment of the display device according to the present invention;

25 figure 2, shows in detail the positioning of the light emitting device on the display device according to the first embodiment of the present invention;

30 figure 3, shows a system according to a first embodiment of the present invention;

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figure 4, shows a system according to a second embodiment of the present invention;

figure 5, shows a system according to a third embodiment of the present invention;

figure 6, shows a system according to a fourth embodiment of the present invention; and

figure 7, shows a system according to a fifth embodiment of the present invention.

**Detailed description of preferred embodiments**

In the following description of the various embodiments, reference is made to the accompanying figures which form a part hereof, and in which is shown by way of illustration various embodiments in which the invention may be practiced. It is to be understood that other embodiments may be utilized and structural and functional modifications may be made without departing from the scope of the present invention.

A display device is created by placing an array of light emitting diodes on a rotary member, see fig. 1. The light emitting diodes are placed so that each light emitting diode is placed at a different length from the centre of rotation of the rotary member, preferably in such a way that the array of light emitting diodes is placed at regular intervals on the rotary member from the centre of rotation, to the edge. When light emitting diodes of more than one colour are used to create a colour display it is done by placing the light emitting diodes of different colours on the rotary member in such a way that they are at the same length from the centre of rotation, but

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placed at different angles in relation to the centre of rotation on the rotary member. When the rotary member is rotated light-emitting diodes of different colour will pass by a single point in space, see fig 2. The central processing unit is able to register where on the rotation the rotary member is at a given point in time, and modulate the light emitting diodes accordingly. When light emitting diodes of different colour are modulated in the same point in space, as the light emitting diodes placed on the rotary member pass this point it is possible to create the impression that the point in space is a given colour, based on the modulation of the two light emitting diodes. Preferably the rotary member should have light-emitting diodes in the colours red green and blue, making it possible to create a full colour display by modulating a red, green and blue light-emitting diode as they respectively pass the same point in space.

The rotary member, or another display device may be connected to a communication unit, said unit being able to send and receive digital information from a central server. The rotary member, or another display device, particularly an advertising display, may be connected to the communication unit or integrated with it in such a way that it is possible to transfer data from the communication unit to the rotary member, and may be possible to transfer data from the rotary member to the communication unit. The communication unit can communicate via wireless to a wireless gateway, said gateway being able to communicate with a server.

The system according to a first embodiment of the present invention, shown in figure 3, makes it possible to create a two way communication between the display device and the server. It is possible using this system to update the display device,

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which may be a rotary member or an advertising display, by sending information through the wireless gateway to the display device through the wireless module. The wireless module and the wireless gateway can communicate using WAP, using GSM, using GPRS, using UMTS, using bluetooth, using 802.11b, using I-mode, or using another suitable technology.

The system according to the third, fourth and fifth embodiment of the present invention comprises several servers that are connected, for instance through the Internet, or through a virtual private network. When communicating from the server to an array of displays this may be done by point to multipoint communication, such that more than one display can receive the information that is sent through the wireless gateway to the wireless module and to two or more displays. See fig. 5, 6, and 7.

The system according to the first through fifth embodiment of the present invention furthermore comprise a second wireless gateway, which may be the same as the wireless gateway used to communicate with the display device, or it may be a different wireless gateway using the same or a different wireless protocol. The second wireless gateway can be used for communicating with mobile devices, see fig. 4. The mobile device may be, but is not limited to: mobile phones or personal digital assistants with a connectivity that allows them to communicate with said second wireless gateway.

The system according to the second embodiment of the present invention enables a user operating a mobile device to communicate with the server through said second wireless gateway. The server, when communicating with the mobile device, comprises a program that allows one or more display devices to

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be updated. This update comprises a text message sent by the user of the mobile device using for instance SMS, this message being relayed in full or parsed to a display device. The update further comprises a predefined action such as for instance  
5 showing a picture on one or more displays. When a user communicates with the server this communication may be to a particular wireless gateway that comprises the ability to charge the user an amount of money for the communication, for instance using an overtaxed SMS service. Said wireless gateway  
10 can be connected directly to the server, or it may relay information the server, either directly or through an appropriate means.

A user operating a mobile device may also connect directly to  
15 the display, by means of the mobile device communicating with the wireless module connected to the display, and the wireless module relaying information to the display.

Each individual display may comprise a unique ID tag, making it  
20 possible to identify each display separately. This makes it possible to communicate to only one, or a specific group of displays. If a user wishes to communicate with one particular display he may do so by communicating the ID tag, or information that the server is able to identify as relating to  
25 said ID tag. If a user is watching or has been watching a particular display, the display may show the ID tag or information that the server is able to identify as relating to said ID tag, and the user may communicate to only one or a particular group of displays based on the ID tag. This  
30 communication based on ID tags or information that the server is able to identify as relating to said ID tags may be stored, for instance on the server. The server, or another server, may hold a database with information about said communication,

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along with other parameters for a particular display. This information makes it possible to calculate and show information regarding demographics, usage and other data about an individual display. If the user communicates information such as age, gender, or other information this information, along with the ID tag may also be stored, and the database will be able to show this information in whole, or in a calculated form, such as for instance an average, making it possible for the database to hold information about for instance average age of viewers of a particular display. Instead of using an ID tag to identify a particular display it may also be identified by locating the mobile device using for instance triangulation, and assuming that the display the user wishes to communicate to is the one nearest to this location.

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The system according to the fourth embodiment of the present invention comprises a program that may be located on the server, which program is able to group two or more displays based on parameters such as location, average age, frequency of a user communicating with a display or other information. A defined group may comprise an ID tag, making it possible to use point to multipoint communication to send information to the displays in that group. See fig. 6.

The server according to the fifth embodiment of the present invention is connected to the Internet, either directly or through another server or device, making it possible to communicate from the server to the Internet. See fig. 7. This makes it possible for a user using a browser or a program connected to the Internet to communicate with one or more displays through the server. This makes it possible for the user to either send messages directly to one or more displays, particularly a group of displays, or to communicate with the

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server, the server scheduling information to be sent to one or more displays at a later time. A user may pay for this service through a billing system. This may be using a credit card to pay for said communication.

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Claims

1. A system for presenting and controlling information on a display device and comprising a server, a wireless gateway and said display device having a wireless module communicating with the server through the wireless gateway, and said server is adapted to update information presented on the display device through the wireless gateway.
2. A system according to claim 1, wherein the display device comprises a rotary member with a plurality of light emitting diodes of at least two colours arranged such that pairs of light emitting diodes of different colours will pass through the same global point on the display once every revolution of the rotary member, and a processing unit able to control the light emitting diodes, such that the processing unit can create the impression of a global point of a chosen colour created by modulating the intensity of the light emitting diodes of different colour when they pass through said global point.
3. A system according to any of claims 1 or 2, wherein the display device is adapted to display advertisements.
4. A system according to any of claims 1 to 3 furthermore comprising a mobile device able to communicate with the server through the wireless gateway.
5. A system according to claim 4, wherein the mobile device is adapted to update the display device by communicating with the server through the wireless gateway.



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6. A system according to any of claims 1 to 5, wherein the wireless gateway is GSM, GPRS, UMTS, 802.11b, bluetooth, I-mode, or any combination thereof.

5 7. A system according to any of claims 1 or 6 further comprising one or more display devices, and wherein the server is adapted to multicast to the one or more display devices substantially simultaneously using the wireless gateway

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8. A system according to claim 7, wherein the system is adapted to group the one or more display devices according to parameters set for each of the one or more display devices so as to display specific information for each group of the one or more display devices.

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9. A system according to any of claims 1 to 8, wherein the server and the display device is connected to a communications network such as a wired or wireless dedicated line, local area network, metropolitan area network, wide area network, the Internet, or any combination thereof, so as to enable communication between the server and the display device.

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25 10. A system according to claim 9 further comprising a computer connected to the communications network and comprising a computer program for controlling the display device through the server.

30 11. A system according to any of claims 1 to 10, wherein the system is adapted to request an user payment for displaying information on the display device.

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12. A system according to claim 11, wherein the payment is performed with a credit card.

13. A system according to any of claims 1 to 12, wherein the system is adapted to charge a mobile device for communicating with the server.

14. A system according to claim 13, wherein the charge is carried out using overtaxed text message such as a short messaging service message.

15. A system according to any of claims 1 to 14, wherein a mobile device is adapted to send a message to the server, which message comprises an unique ID tag for the display device.

16. A system according to claim 8, wherein the grouping is based on demographic information, such as location, average age, gender,

17. A system according to claim 16, wherein the demographic information is collected from the mobile device communicating with the server.

18. A system according to 4 to 17, wherein the mobile device provides configuration information to the server sorting the configuration information for later use.

19. A system according to claim 18, wherein the configuration information is sorted according to the ID tag of each display device, thereby enabling the server to store configuration information submitted from the mobile device.

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20. A system according to any of claims 1 to 19, wherein said display device further comprises a recording device located on said rotary member for recording user interaction in a touch sensitive area.

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21. A system according to claim 20, wherein said recording device comprises one or more sensors, the sensors being located so that each sensor is placed at a different length from the centre of rotation of the rotary member.

10

22. A system according to claim 21, wherein said one or more sensors are placed at regular intervals on the rotary member from the centre of rotation, to the edge.

15

23. A system according to any of claims 21 or 22, wherein said recording device further comprises a central processor able to receive input from said one or sensors.

20

24. A system according to claim 23, wherein said central processor is adapted to hold information enabling said central processor to calculate the exact angle of a revolution of an associated rotating member in any specific point in time.

25

25. A system according to any of claims 23 or 24, wherein said central processor is adapted to perform an action when an object is in the vicinity of said one or more sensors, said action being based on which global point on the display device the object is in the vicinity of.

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26. A system according to any of claims 21 to 25, wherein said one or more sensors are magnetic sensors registering changes in the magnetic field.

27. A system according to any of claims 21 to 25, wherein said one or more sensors are acoustic sensors registering changes in sound volume or modulation.

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28. A system according to any of claims 21 to 25, wherein said one or more sensors are light sensors registering changes in light intensity

10 29. A display device comprising a rotary member with a plurality of light emitting diodes of at least two colours arranged such that pairs of light emitting diodes of different colours will pass through the same global point on the display once every revolution of the rotary member, and  
15 a processing unit able to control the light emitting diodes, such that the processing unit can create the impression of a global point of a chosen colour created by modulating the intensity of the light emitting diodes of different colour when they pass through said global point.

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30. A display device according to claim 29, wherein the display device incorporates any features of the system according to claims 1 to 28.

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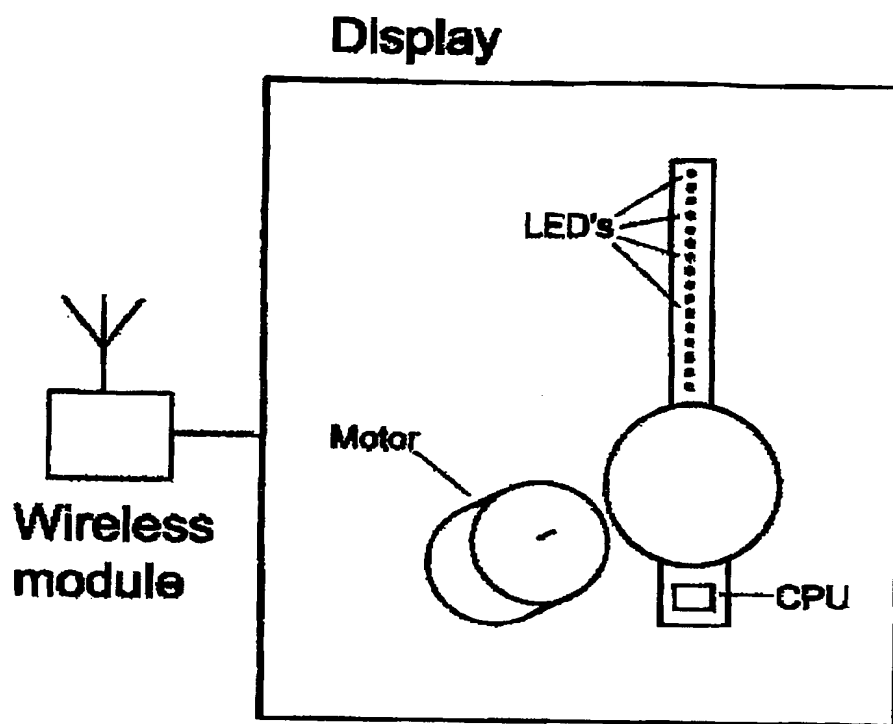


Fig. 1

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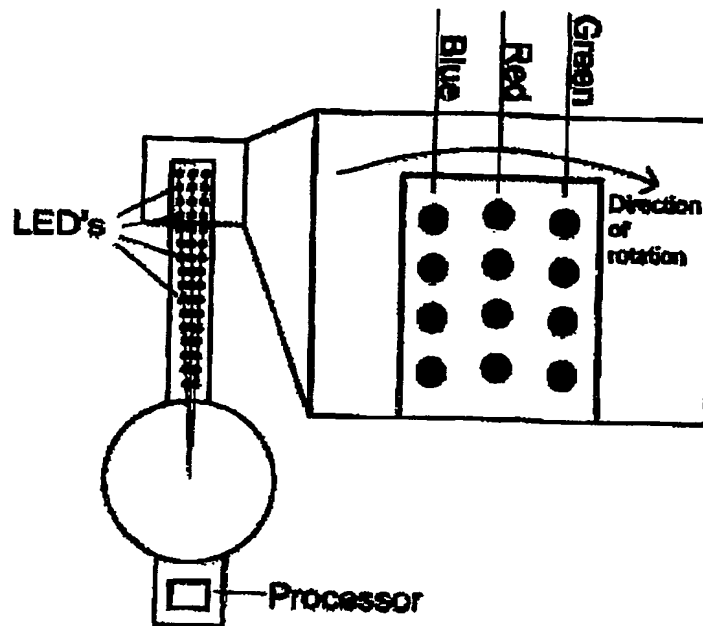


Fig. 2

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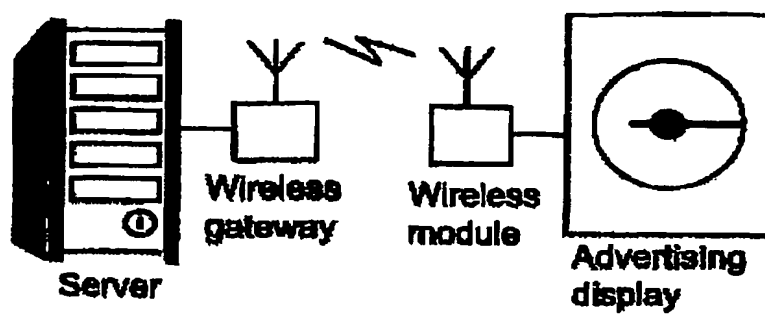


Fig. 3

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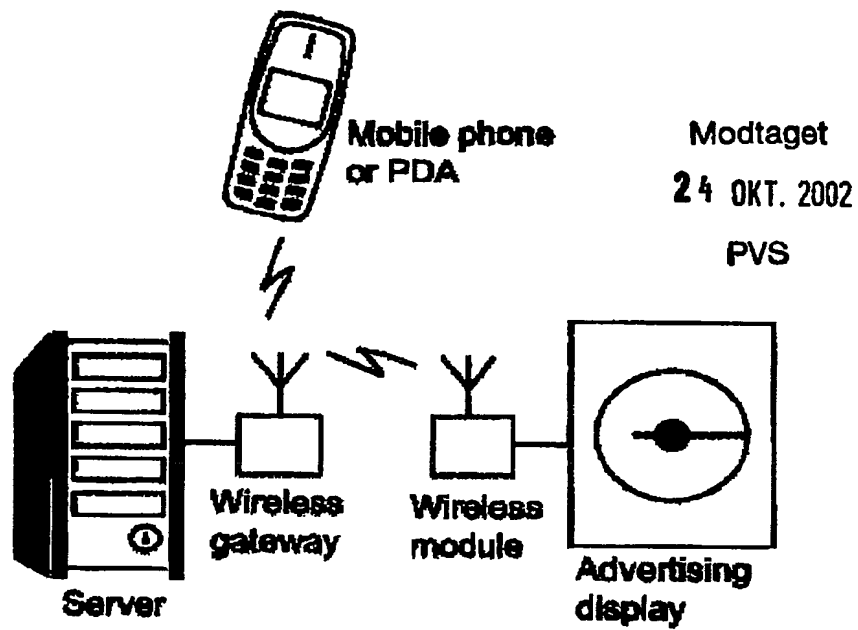


Fig.4



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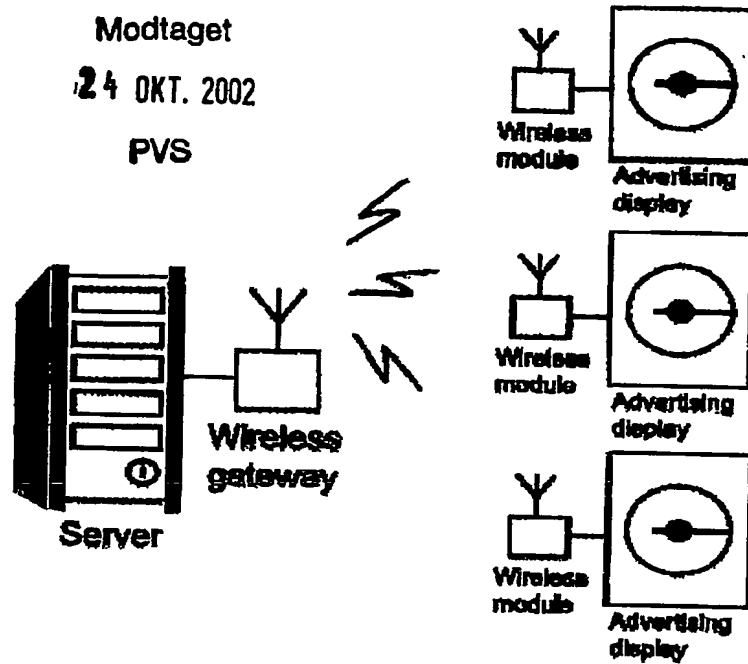


Fig. 5

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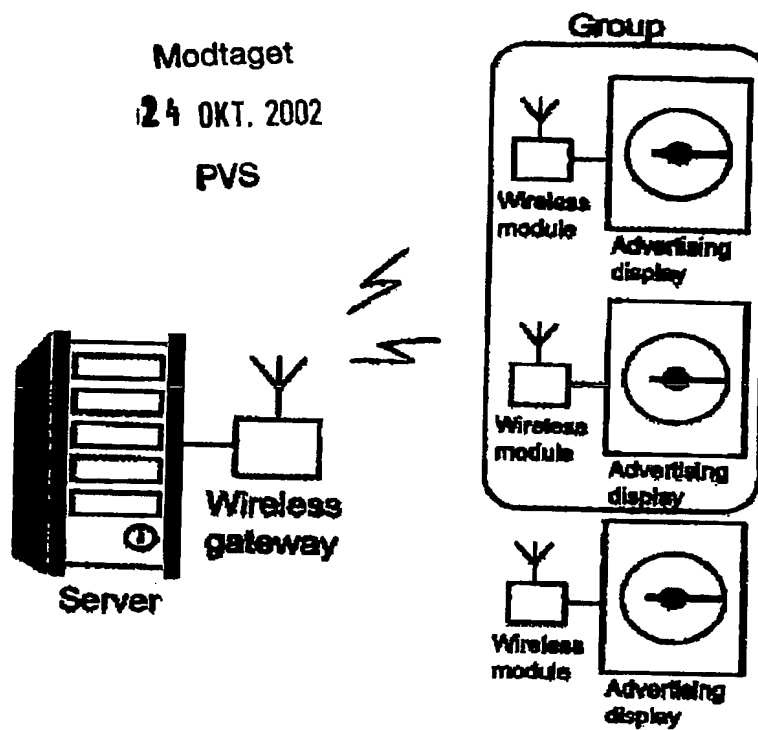


Fig. 6

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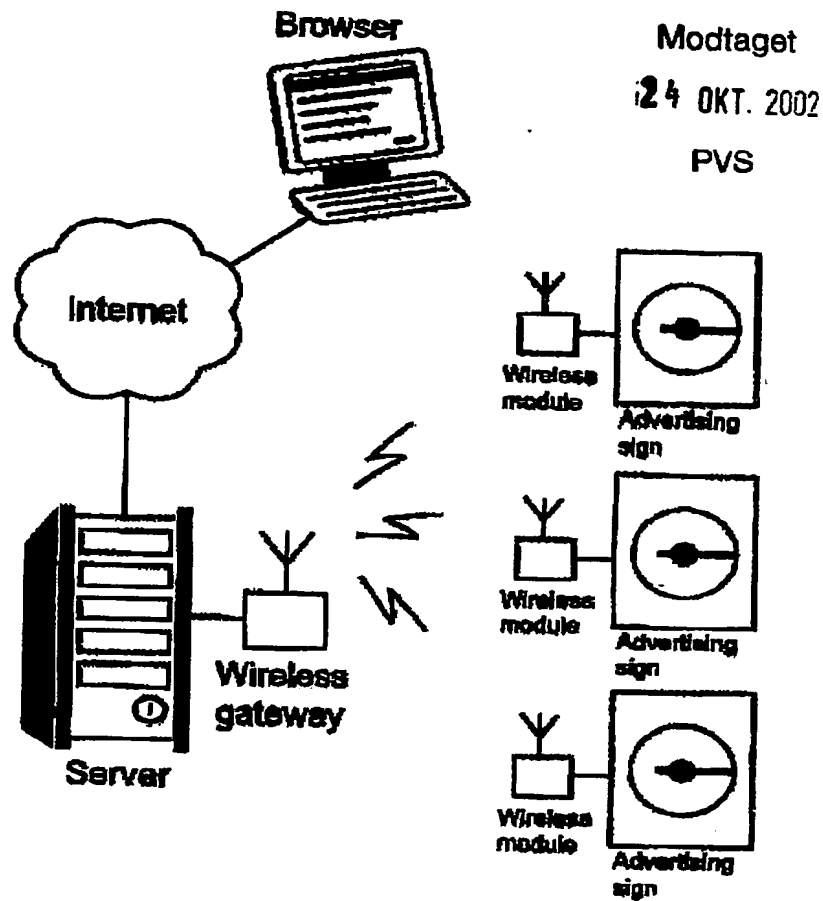


Fig. 7

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